Volvo Service Manual P1800 U S 5013 4 1000 12 64 Engelska
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FOREWORD

This Manual contains instructions for the Volvo P 1800 sports car.

It is divided up into 12 parts in accordance with the register. The pages and illustrations in each part are numbered in such a way that the first number shows the part concerned while the remainder shows the number of the page in that particular section, for example, under the heading Transmission 3-1, 3-2 etc. A convenient way to find the particular section you are looking for is to bend the right side of the Manual so that the arrows on the register correspond to index marks on the first page of each section.

The various section are divided up as follows:

- Description
- Repair Instructions
- Fault Tracing
- Tools
- Specifications

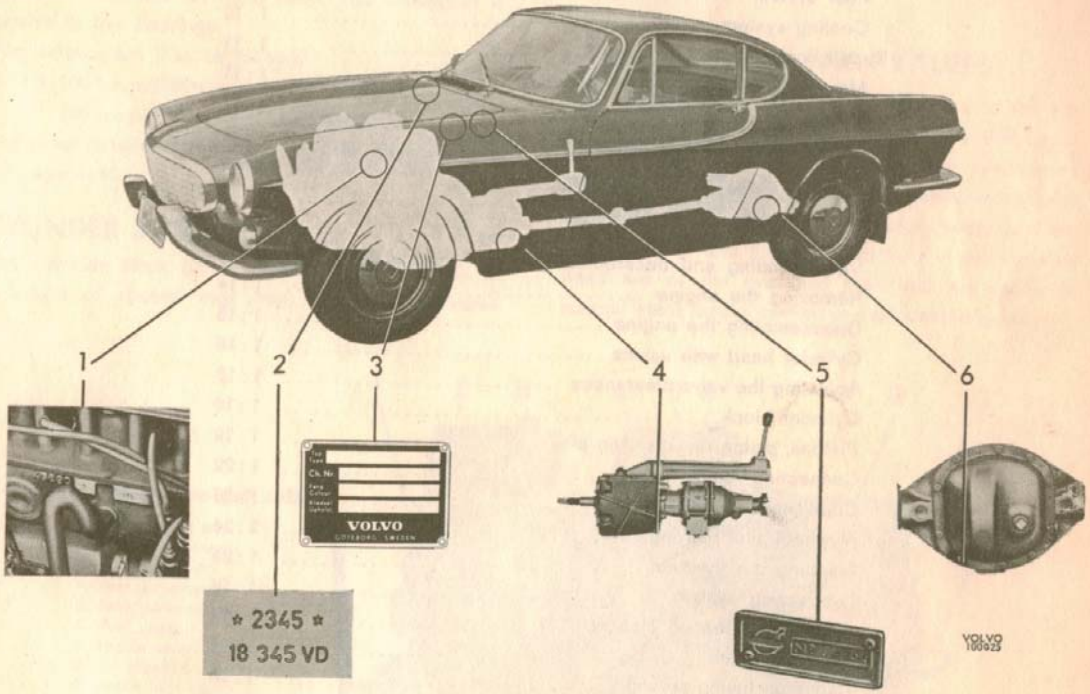
The instructions given in this book assume as a rule that special tools are used and are based on experience from time method studies. The same result can be obtained by several different working methods but if you follow the instructions in this book you will always get the quickest results.

AKTIEBOLAGET VOLVO
Göteborg – Sweden

TYPE DESIGNATIONS

This Service Manual deals with the Volvo P 1800 series having the following type designations and main data:

Type designation	Model	With effect from:	Chassis No.	Engine	Gearbox	Rear axle ratio	Remarks
P 1800	A	May 1961	1—6000	B 18 B early prod.	M 40 or M 41	4.56:1 or 4.10:1	Assembled in England
P 1800	B	April 1963	6001—8000	B 18 B late prod.	M 40 or M 41	4.56:1 or 4.10:1	Assembled in Sweden
P 1800 S	D	August 1963	8001—				



1) Engine type designation, serial number and part number.
2) The chassis number is stamped on the body above the battery bracket.
3) The chassis number and type designation of the car and the code number for colour and upholstery.
4) The gearbox type designation, serial number and part number.
5) Body number.
6) Rear axle plate showing number of teeth and reduction ratio is fixed on the lower part of the inspection cover.

GENERAL DATA

Weight	approx.	1210 kg (2670 lb.)
Axle pressure, front	„	630 kg (1390 lb.)
„ „ rear	„	570 kg (1260 lb.)
Wheelbase		2450 mm (96.46″)
Trackwidth		1315 mm (51.78″)
Overall length		4400 mm (173.23″)
Overall width		1700 mm (66.93″)
Overall height, unladen		1285 mm (50.59″)
Ground clearance, unladen		155 mm (6.10″)
Turning circle (measured on centers of tire treads)	approx.	9500 mm (31′2″)

PART 1

ENGINE

DESCRIPTION

GENERAL

The designation of the engine in the P 1800 is B 18 B. It is a four-cylinder, water-cooled, overhead-valve engine with twin horizontal carburetors.

There are separate inlet and exhaust ports in the cylinder head, one for each valve. The crankshaft is carried in five bearings.

The outputs are thus as follows:

B 18 B 100 b.h.p./5500 r.p.m. (SAE) early prod.
108 b.h.p./5800 r.p.m. (SAE) late prod.

For other detailed information, see the specifications on page 1:41.

CYLINDER BLOCK

The cylinder block (29, Illustration 1-A) is made in one unit of special cast iron. The cylinder bores which are surrounded by cooling water jackets, are machined directly in the block. The oil channels in the block are arranged in such a way that the oil cleaner, which is of the fullflow type, is connected directly to the oil cooler on one side of the block.

CYLINDER HEAD WITH VALVES

The cylinder head (23), which is attached to the top of the block by means of bolts, covers the upper part of the cylinders and forms the combustion chambers. The cylinder head also contains the inlet and exhaust ports as well as cooling water jackets. The valves (4 and 8, Illustration 1-A) in the cylinder head are of the overhead type and are made of special steel, being carried in replaceable guides.

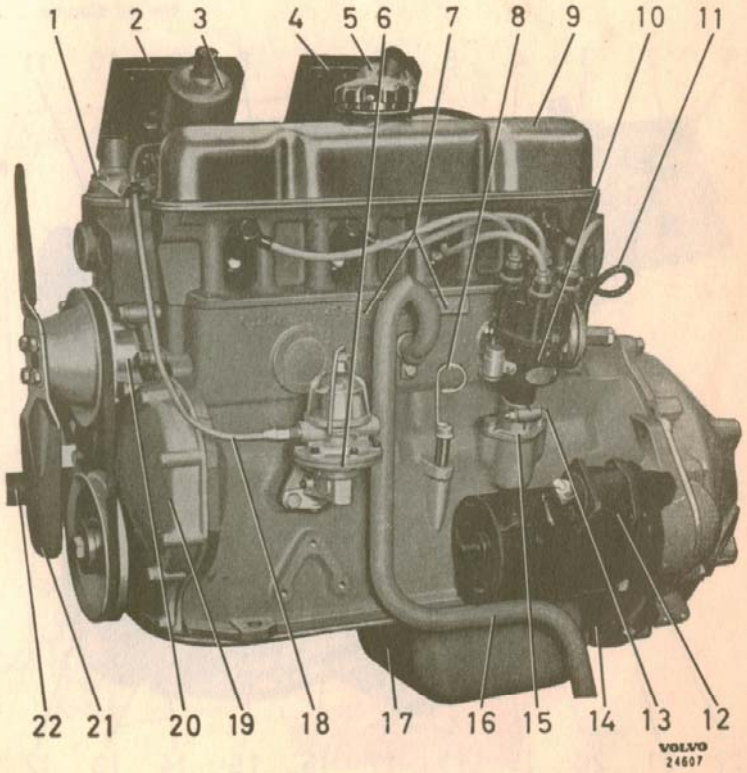


Fig. 1-1. The engine (left side)

1. Water outlet pipe
2. Front air cleaner
3. Front carburetor
4. Rear air cleaner
5. Rear carburetor
6. Fuel pump
7. Engine serial number
8. Oil dipstick
9. Rocker arm cover
10. Distributor
11. Vacuum line
12. Starter motor
13. Lock screw
14. Cover plate
15. Retainer
16. Breather pipe
17. Oil pan
18. Fuel pipe
19. Timing gear casing
20. Water pump
21. Fan
22. Water inlet pipe

1:1

CONTENTS

Part 1. Engine

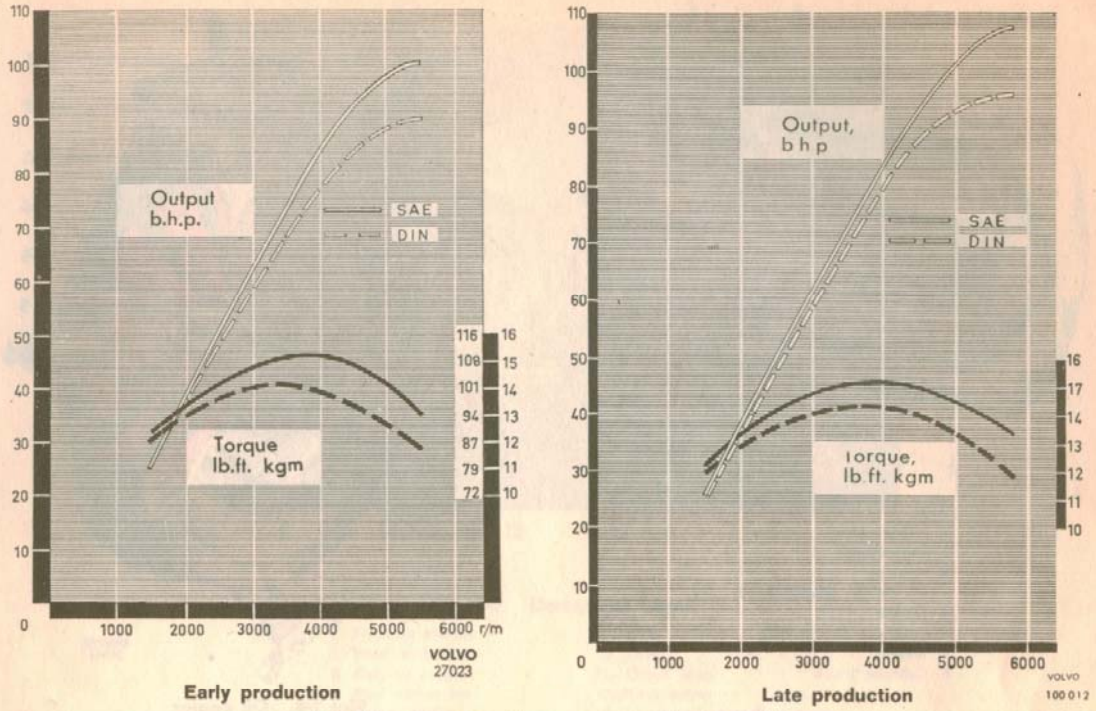


Fig. 1-3. Output and torque curves. Engine B 18 B

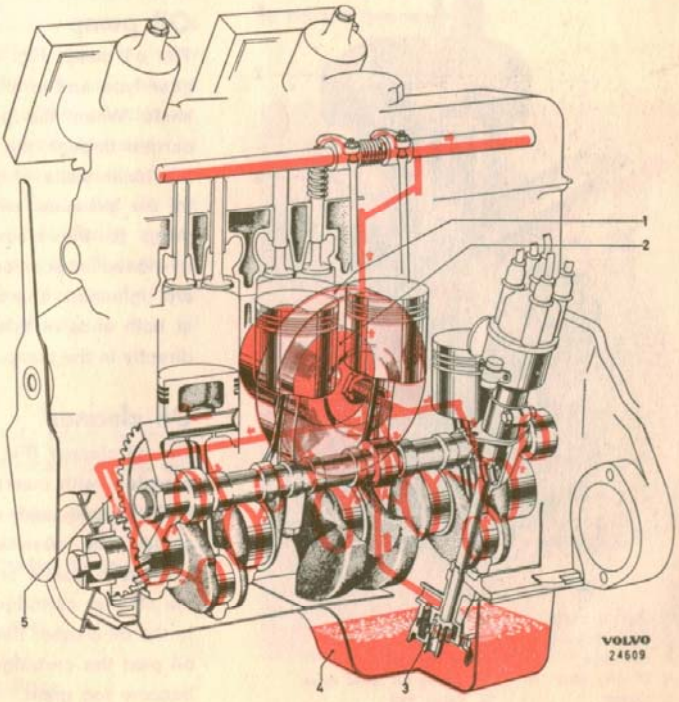


Fig. 1-4. The lubricating system

1. Oil cooler
2. Oil cleaner
3. Oil pump
4. Oil pan
5. Nozzle

CRANKSHAFT WITH BEARINGS

The crankshaft (44) is of forged steel and has ground and surface-hardened crankpins. It is carried in five main bearings, the rear of which also functions as an axial guide bearing. There are drillings through the crankshaft for the lubricating oil.

The bearing shells, which are replaceable, consist of steel-backed, indium-plated, lead-bronze bearing metal.

CAMSHAFT WITH VALVE LIFTERS

The camshaft (45) is made of special-alloy castiron and has surface-hardened cams. The camshaft is driven from the crankshaft by means of gears with a ratio of 1:2. Axial guidance is obtained by means of an axial washer on the front end of the shaft. The axial clearance is determined by a shim behind the camshaft gear.

The valve lifters (27) are influenced directly by the camshaft. They are located in ground holes in the block above the camshaft and transfer the movement to the valves through push rods and rocker arms. There are no inspection covers for the valve lifters since the valve lifters are accessible from the top after the cylinder head has been removed.

CONNECTING RODS, PISTONS AND PISTON RINGS

The connecting rods (48) are of drop-forged steel and are fitted at the top with finely-finished bushings which act as bearings for the piston pins. The connecting rod bearings on the crankshaft consist of precision-manufactured, replaceable bearing shells. The pistons (46) are made of light-alloy and each has two compression rings and one oil scraper ring. The upper compression ring on each piston is chromed to reduce cylinder wear.

The piston pins (50) are fully-floating in both the pistons and connecting rods. The axial movement of the piston pins is limited by the circlips in the piston pin holes.

LUBRICATING SYSTEM

The engine is lubricated by oil under pressure, see Fig. 1–4. The pressure is produced by a gear pump, driven from the camshaft and located under the crankshaft in the oil pan. The gears in the pump force the oil past the relief valve which is also located in the pump and then through the oil cooler, oil cleaner and so out through the drillings to the various lubricating points. All the oil which is forced out to the lubricating points thus first passes through the oil cleaner.

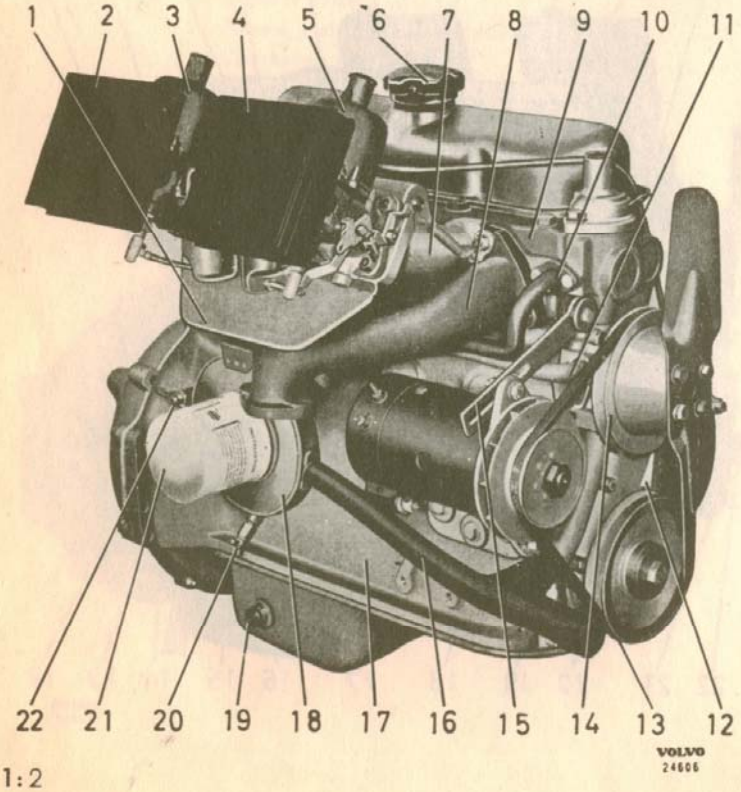


Fig. 1-2. The engine (right side)

1. Shield plate
2. Rear air cleaner
3. Rear carburetor
4. Front air cleaner
5. Front carburetor
6. Oil filler cap
7. Inlet manifold
8. Exhaust manifold
9. Cylinder head
10. Water pipe (to oil cooler)
11. Water pipe (from heater)
12. Setting marks
13. Pulley
14. Pulley
15. Belt tensioner
16. Water pipe
17. Cylinder block
18. Oil cooler
19. Plug for oil temperature gauge
20. Drain cock for water
21. Oil cleaner
22. Drain cock for water

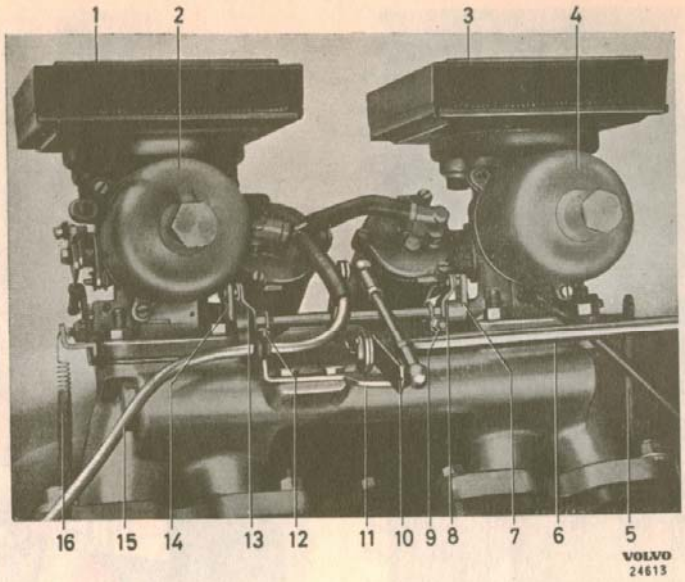


Fig. 1-8. Carburetor layout

1. Front air cleaner
2. Front carburetor
3. Rear air cleaner
4. Rear carburetor
5. Return spring
6. Control shaft
7. Lever on throttle spindle
8. Lever on intermediary shaft
9. Lock screw
10. Lever
11. Check stop
12. Lock screw
13. Lever on intermediary shaft
14. Lever on throttle spindle
15. Fuel pipe
16. Return spring

Oil cooler

The oil cooler (Fig. 1-6) is fitted between the oil cleaner and the cylinder block and consists of an inner part for the oil which is surrounded by a cooling jacket. The engine cooling water is taken through the cooling jacket. When the oil passes through the cooler on its way to the oil cleaner, part of the heat from the oil is conducted away by the cooling water. The cooling water cannot go the nearest way from the inlet (1) to the outlet (6) but is forced to circulate round the oil cooler by means of the stop plates (5). The oil is pressed through the pairs of disks one after the other due to the stop plates (4) and then passes out finally to the oil cleaner.

IGNITION SYSTEM

The distributor (25, Illustration 1-A) which is driven through a bevel gear from the camshaft is fitted with both centrifugal and vacuum governors. The direction of rotation is anti-clockwise and the order of firing is 1-3-4-2. See also Part 10.

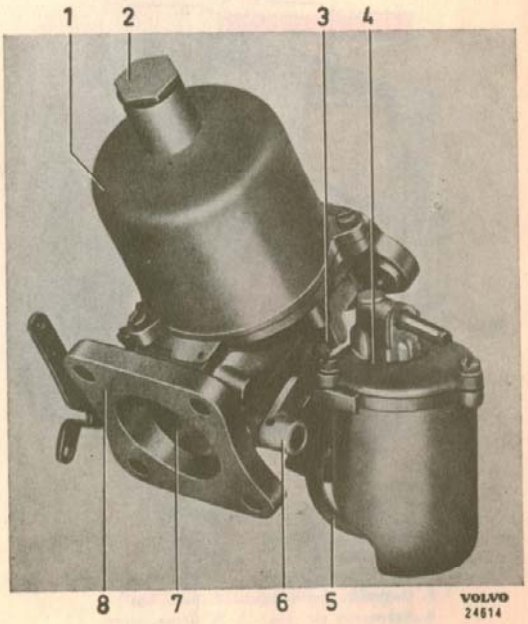


Fig. 1-9. Carburetor viewed from the left

1. Suction chamber
2. Screw for damping plunger
3. Lift pin
5. Fuel line
4. Float bowl cover
6. Lever
7. Throttle
8. Connecting flange

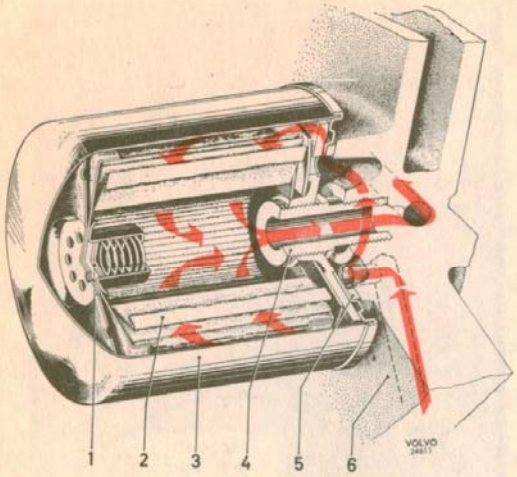


Fig. 1-5. Oil cleaner

1. Relief valve
2. Cartridge
3. Housing
   (cannot be disassembled)
4. Nipple
   (see also 10, Fig. 1-6)
5. Gasket
6. Cylinder block

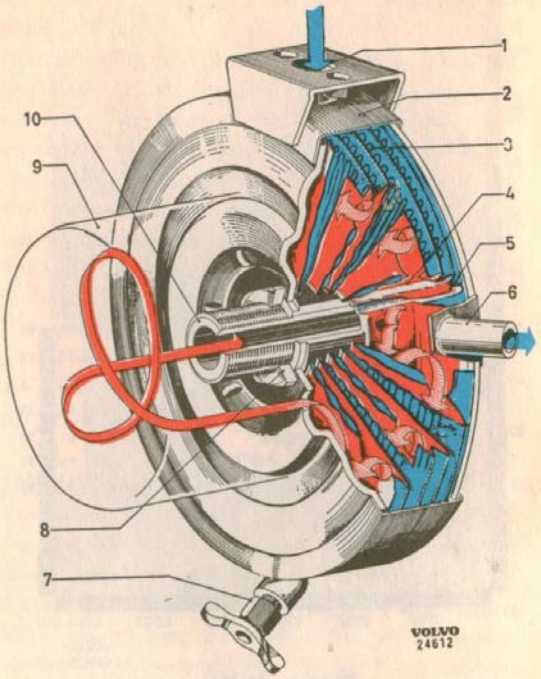


Fig. 1-6. Oil cooler

1. Cooling water inlet
2. Housing
3. Disks
4. Stop for oil
5. Stop for cooling water
6. Cooling water outlet
7. Drain cock for cooling water
8. Nut
9. Oil cleaner
10. Nipple

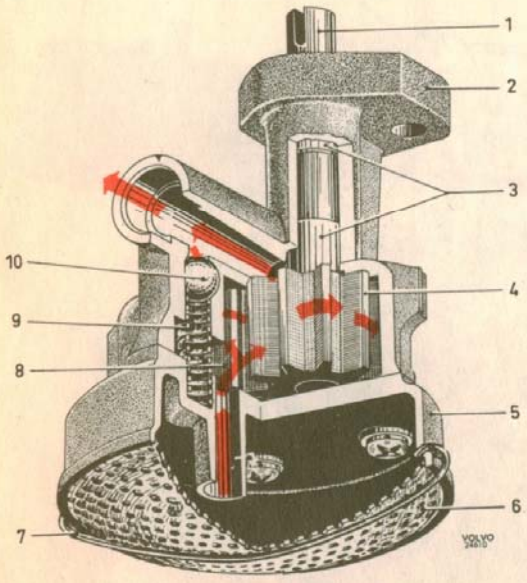


Fig. 1-7. Oil pump

1. Driving shaft
2. Pump housing
3. Bushings
4. Driving gear
5. Cover
6. Strainer
7. Bail
8. Driven gear
9. Spring for relief valve
10. Valve ball

Oil pump

The oil pump, Fig. 1-7 (41, Illustration 1-A) is of the gear type and is driven through gears from the camshaft. When the pump gears start rotating, oil is carried through the spaces between the teeth along the inner walls of the pump from the suction side to the pressure side. The pressure pipe from the pump to the block has no screw unions and is tensioned in position when the pump attaching bolts are tightened. There are seal rings of special rubber at both ends of this pipe. The relief valve is located directly in the pump.

Oil cleaner

The oil cleaner (Fig. 1-5) is manufactured in one unit complete with insert cartridge. The cleaner is of the fullflow type and is bolted directly onto the oil cooler. The oil which is forced out to the various lubricating points on the engine first passes through the cleaner cartridge which is made of special paper. In the oil cleaner there is a relief valve which releases oil past the cartridge if the resistance to flow should become too great.

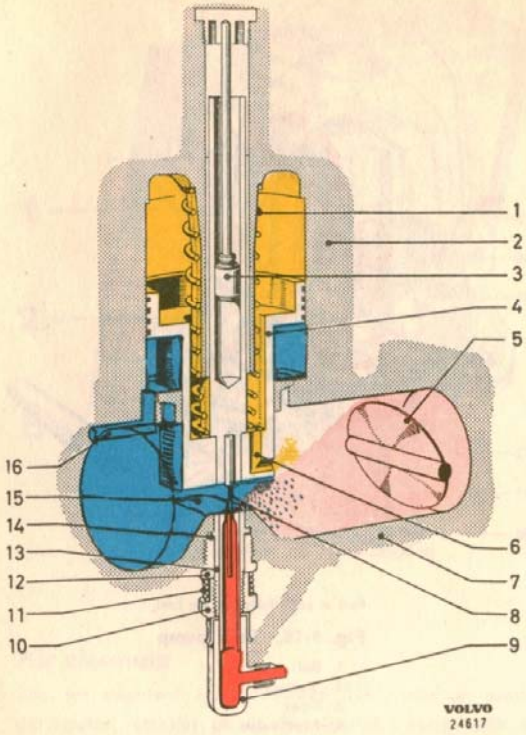


Fig. 1-13. Function of carburetor

Blue = atmospheric pressure
Yellow = vacuum
Red = fuel
Light red = fuel-air mixture

1. Spring
2. Suction chamber
3. Damping plunger
4. Piston in suction chamber
5. Throttle
6. Channel
7. Housing
8. Fuel needle
9. Jet
10. Adjuster nut
11. Lock spring
12. Lock nut
13. Jet sleeve
14. Washer
15. Bridge
16. Channel

by the float is fitted in the cover. Fuel is taken to the lower end of the jet through a flexible hose from the lower part of the float bowl (8, Fig. 1-11).

Cold Starting

When starting a cold engine, the fuel-air mixture can be made richer by lowering the jet, Fig. 1-12. The jet is influenced through a link system from the choke control on the instrument panel. Since the fuel needle is tapered, the fuel flow area is increased when the jet is lowered.

When the choke control is pulled out, the outer end of the lever (3) is pressed downwards and this influences the jet so that it is pushed down. The rapid idling screw is also influenced by the cam on the lever (2, Fig. 1-15) and the throttle opening is somewhat increased.

Operation

The stream of air which passes through the carburetor while it is operating increases in speed when it passes the constriction which is called the bridge (15). See Fig. 1-13.

Fuel is supplied to the air stream through the jet which terminates at the bridge.

The vertical position of the piston in the suction chamber is determined by the difference in pressure between the degree of vacuum in the carburetor and atmospheric pressure – the space above the piston is connected with the space between the throttle and the bridge – while the underside of the piston is influenced by atmospheric pressure. When loading increases, the degree of vacuum increases whereby the piston and the tapered fuel needle rise and permit an increased amount of fuel-air mixture to pass into the cylinders.

The amount of fuel and air supplied to the cylinders is thus dependent on the degree of vacuum in the throat of the carburetor and the carburetors thus work continuously over the whole range.

In order to prevent the piston in the suction chamber from moving too quickly, there is a damping plunger which runs in an oil-filled cylinder.

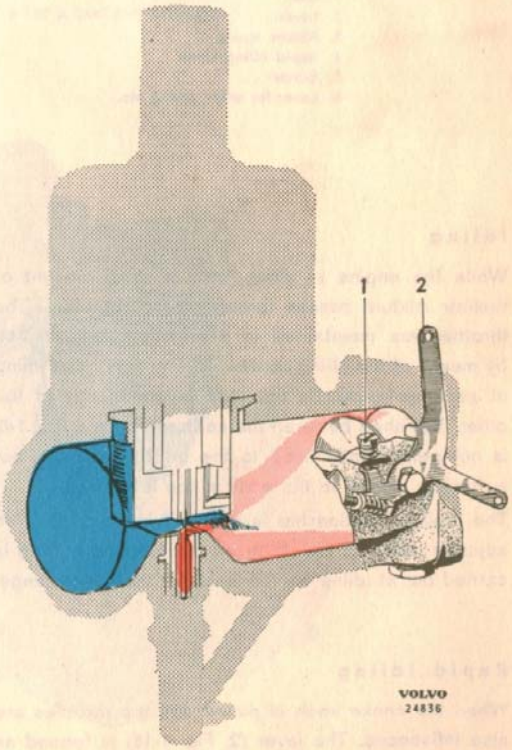


Fig. 1-14. Carburetor, idling

1. Idling screw
2. Lever for return spring

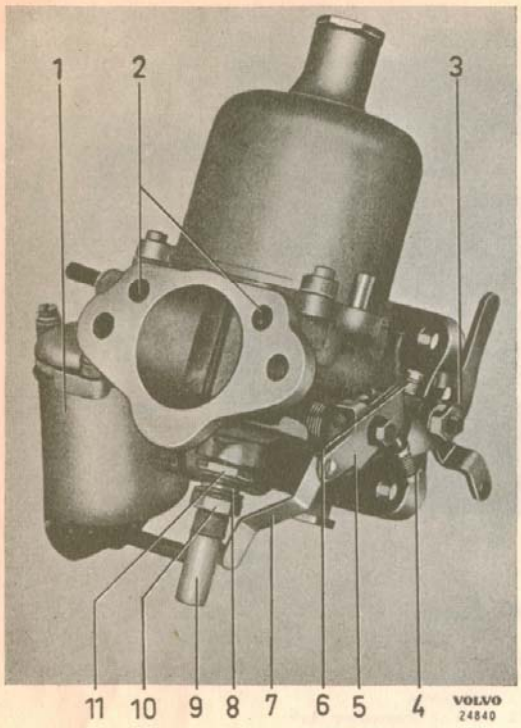


Fig. 1-10. Carburetor viewed from the right

1. Float bowl
2. Ventilation hole
3. Lever
4. Rapid idling screw
5. Lever
6. Idling screw
7. Link for jet
8. Spring
9. Jet
10. Adjuster nut.
11. Locknut

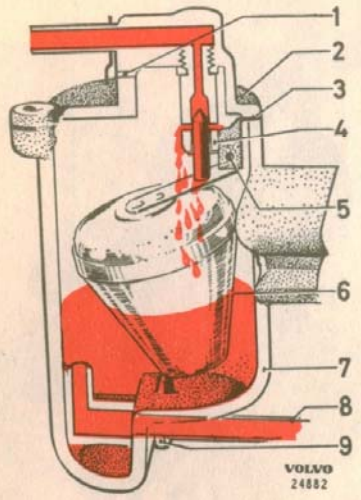


Fig. 1-11. Float system

1. Ventilation hole with protective washer
2. Float bowl cover
3. Gasket
4. Valve
5. Pin
6. Float
7. Float bowl
8. Fuel line
9. Screw union

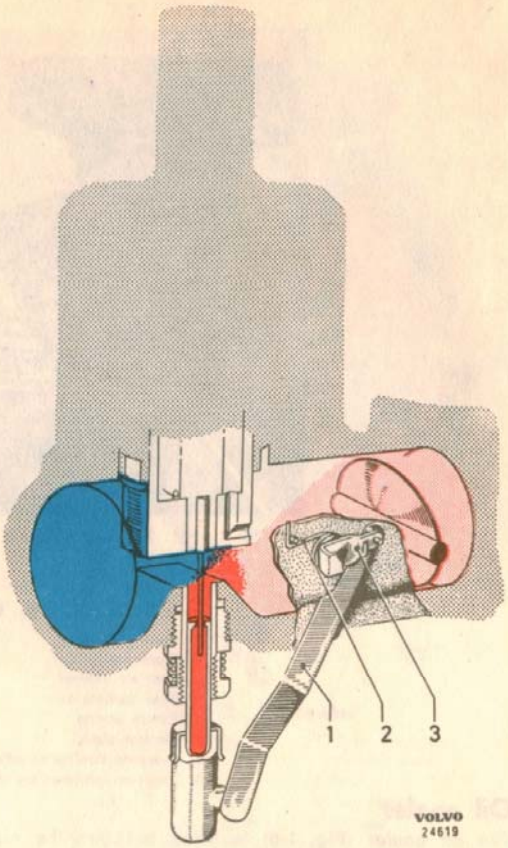


Fig. 1-12. Cold starting

1. Link 2. Return spring 3. Lever

FUEL SYSTEM

The fuel is sucked by a diaphragm type pump from the fuel tank through a filter and is then forced up to the float chambers in the carburetors. There are twin carburetors of the horizontal type. See Fig. 1-8, 1-9 and 1-10.

Carburetors

The twin carburetors, SU-HS 6 (2, Illustration 1-A) are of the horizontal type. Movement of the accelerator pedal is transmitted to the throttles on the carburetors by means of the shaft between the carburetors which is flexibly carried in the carburetor levers. For starting in cold weather, the fuel-air mixture is made richer by lowering the jets. This also causes rapid idling to occur. The various functions of the carburetors are as follows:

Float

The float bowl is screwed to the carburetor housing. See Fig. 1-10. The valve, which is opened or closed

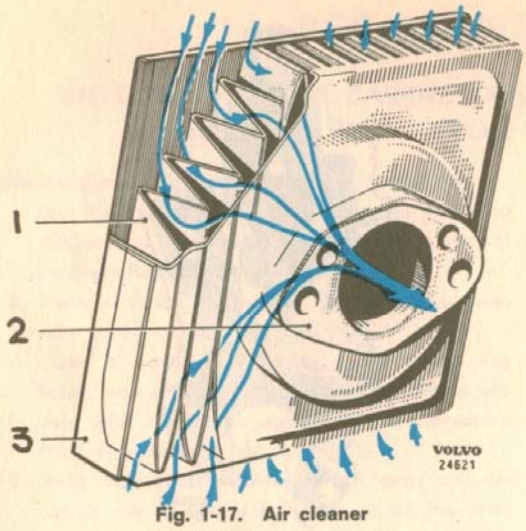


Fig. 1-17. Air cleaner

1. Cartridge (special paper), cannot be removed
2. Gasket
3. Housing

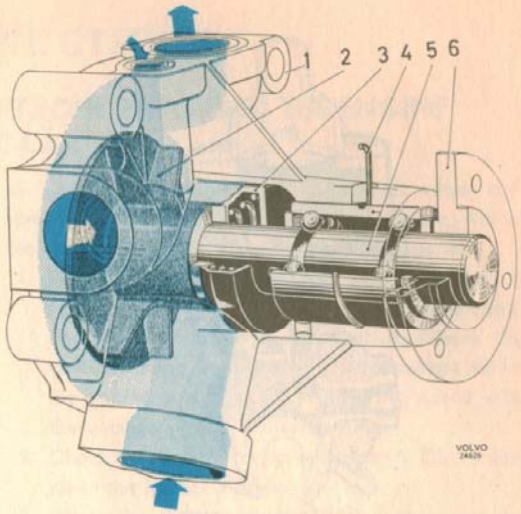


Fig. 1-18. Water pump

1. Housing
2. Impeller wheel
3. Seal
4. Lock spring
5. Shaft with ball bearing (1 unit)
6. Hub

Air cleaners

The air cleaners (1, Illustration 1-A), one on each carburetor, consist of a sheet-metal casing with a cartridge made of special paper. Dust and other impurities in the air are trapped when the air passes through the cleaners (see Fig. 1-17). The air cleaners require no maintainance and may not be oiled in. The complete air cleaners are replaced by new units after a certain mileage.

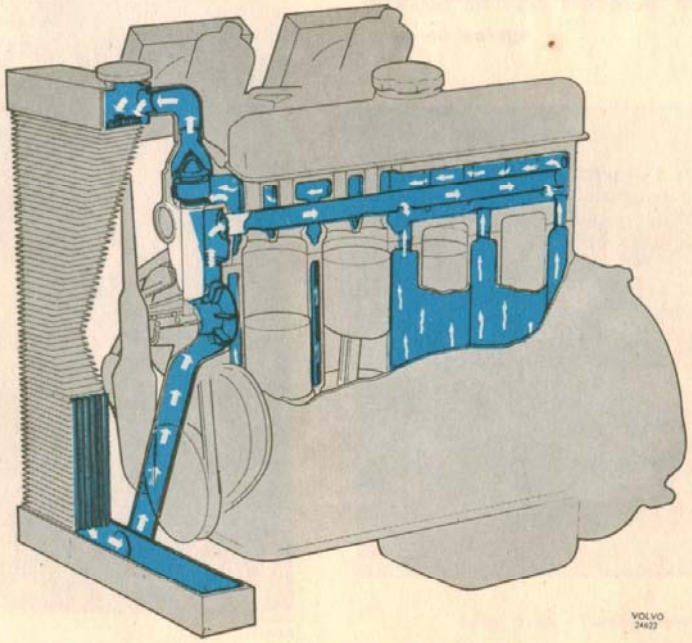


Fig. 1-19. Cooling system

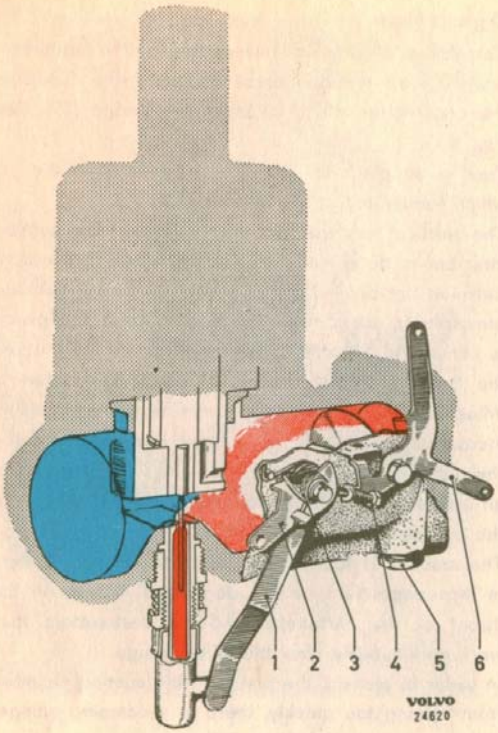
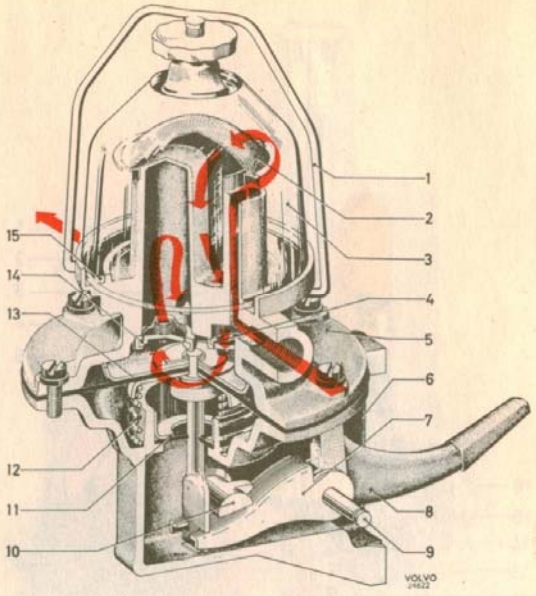


Fig. 1-15. Carburetor, rapid idling

1. Link
2. Lever
3. Return spring
4. Rapid idling screw
5. Screw
6. Lever for return spring etc.



Red = path followed by fuel

Fig. 1-16. Fuel pump

1. Bail
2. Strainer
3. Bowl
4. Inlet valve
5. Upper pump housing
6. Lower pump housing
7. Inner lever
8. Outer lever
9. Shaft
10. Check stop
11. Seal
12. Spring
13. Diaphragm
14. Outlet valve
15. Gasket

Idling

While the engine is idling, only a small amount of fuel-air mixture passes through the carburetors. The throttles are maintained in a slightly open position by means of the idling screws, (1, Fig. 1-14). The idling of each carburetor is adjusted independently of the other. The shaft between the carburetors, see Fig. 1-8, is not permanently fixed to the throttle spindles but is flexibly carried in the ends of the levers.

The fuel/air relationship is adjusted by means of the adjuster nuts (10, Fig. 1-13) on the jets and setting is carried out at idling for the whole of the speed range.

Rapid idling

When the choke knob is pulled out, the throttles are also influenced. The lever (2, Fig. 1-15) is formed as a cam at one end and this cam presses against the rapid idling screw (4) whereby the throttles are opened.

This means that the engine runs at a higher idling speed during the time the choke knob is pulled out.

Fuel pump

The fuel pump is of the diaphragm type and is driven by a cam on the camshaft. The pump is fitted with a disengaging device whereby it ceases to operate when there is a sufficiently high pressure in the float bowls. The design of the pump is shown in Fig. 1-16. The red arrows show the path followed by the fuel.

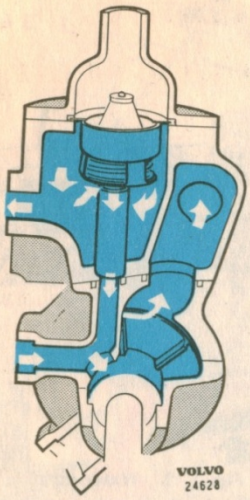


Fig. 1-20. Circulation of cooling water with thermostat closed

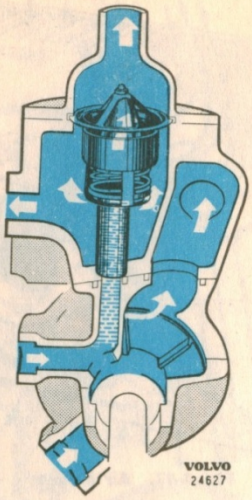


Fig. 1-21. Circulation of cooling water with thermostat open

COOLING SYSTEM

The cooling system, Fig. 1-19, is of the pressure type and is fitted with a circulating pump (Fig. 1-18).

While the engine is cold the cooling water only circulates through the engine itself through a by-pass (Fig. 1-20). When the engine warms up, the thermostat starts to open the outlet to the radiator (Fig. 1-21) whereby the spring-loaded plate on the underside of the thermostat closes the by-pass. Circulation is then regulated by the thermostat so that the engine operating temperature is maintained within the correct limits. A distribution tube in the cylinder head ensures that there is equal distribution of the cooling water though the warmest parts of the cylinder head. The cooling water round the walls of the cylinders circulates by the thermo-siphon principle.

WORK THAT CAN BE CARRIED OUT WITHOUT REMOVING THE ENGINE FROM THE CAR

Measuring the compression pressure

1. Run the engine until it obtains normal operating temperature. Check that the air cleaners are not blocked. Replace them if necessary.
2. Remove all the spark plugs. Depress the accelerator pedal and place a weight on it.
3. Insert a compression tester in the spark plug holes, one after the other, and turn the engine over with the starter motor until the pressure reaches a maximum value.
4. Note the pressure obtained on each cylinder unless the compression tester is of the self-registering type.
5. If low or uneven values are obtained, repeat the compression test after pouring a small quantity of thick oil into each cylinder. If the pressure is low in one of the cylinders, both with and without oil, this is a symptom of leaking valves. If the pressure is higher when the oil has been added, it is probable that the piston rings are worn.

Tuning up the engine

The engine should be tuned up at regular intervals if it is to produce the best results. Tuning up consists of adjusting all settings to the correct value and remedying small defect such as, for example, dirt in the sludge trap, deposits on the spark plugs, etc.

1. Run the engine warm and check (adjust if necessary) the dwell angle (contact breaker gap). Replace burnt contact breaker points. Check the ignition timing setting with a stroboscope while the engine is running at rapid idling speed with the vacuum governor disconnected.
2. Check the distributor gap and clean it. Check and clean the ignition cables.
3. Check the state of charge of the battery and the battery connections.
4. Clean the fuel pump sludge trap. Remove the float bowl covers from the carburetors and blow the housing clean. Remove and clean the plungers of the suction chambers and clean the chambers in white spirit. Re-assemble.
5. Check the air cleaners and replace if necessary.
6. Check the tightening torque of the cylinder head and the tightening of the inlet and exhaust manifolds. Check that there are no air leaks.
7. Remove and adjust the spark plugs or fit new spark plugs.
8. Check the compression on all the cylinders.
9. Adjust the valve clearances. Check that there is no oil leakage.

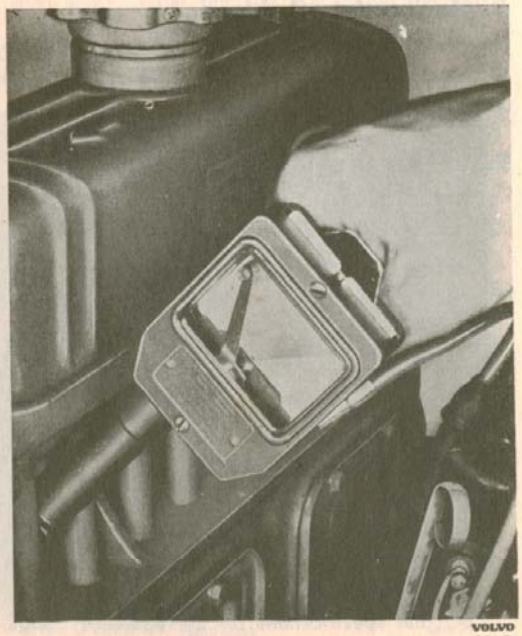


Fig. 1-22. Testing compression

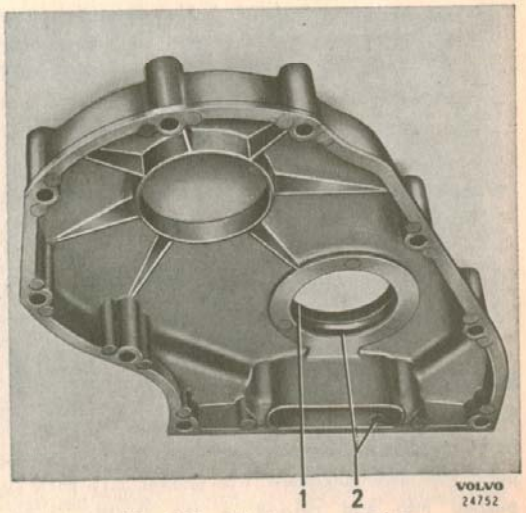


Fig. 1-23. Timing gear casing

1. Seal ring 2. Drain holes

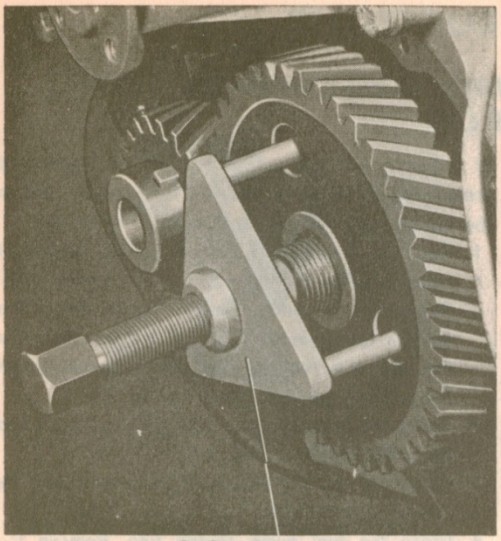


Fig. 1-24. Removing the camshaft gear

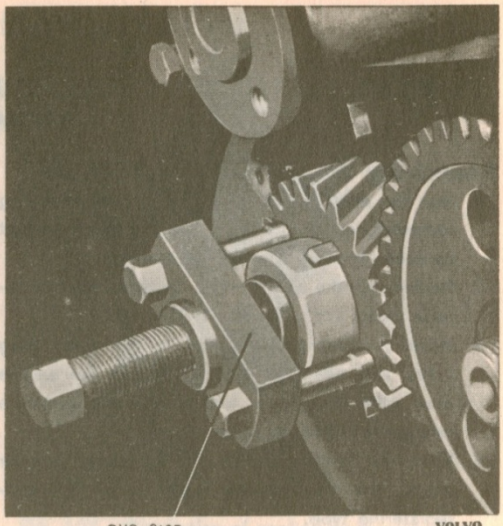


Fig. 1-25. Removing the crankshaft gear

10. Check and adjust when necessary the carburetor settings, see under the heading "Carburetor settings after assembly".

Replacing the cooling water pump

1. Drain off the cooling water.
2. Release the tension on the fan belt. Loosen both the water pipes.
3. Remove the fan and pulley, remove the pump.
4. Fitting is carried out in the reverse order but make sure that the seal rings on the top of the pump are correctly located. Also press the pump upwards against the extension of the cylinder head, for example, with two robust screwdrivers in front of and below the screw union so that the seal between the pump and the cylinder head is good.
5. Make sure that the seal rings on the water pipe are in good condition and push the pipes carefully in when attaching.
6. Fill up with cooling water. Test-run the engine and check that there is no leakage.

Replacing the carburetors

To replace one of the carburetors, both the carburetors must be removed and the attaching screws pulled off simultaneously. The intermediary shaft is pushed into and carried in the throttle levers. When fitting, put the intermediary shaft in position between the carburetors and then fit both carburetors at the same time. See also under the heading "Fuel system".

Replacing the oil cooler

To replace the oil cooler follow the instructions on page 1-24.

Replacing the oil cleaner

When replacing the oil cleaner, this being normally carried out after every 10 000 km (6000 miles), follow the instructions on page 24.

Replacing the timing gear casing

1. Release fan belt tension.
2. Remove the fan and the pulley on the water pump.
3. Remove the crankshaft pulley bolt. Remove the pulley.
4. Remove the timing gear casing. Loosen a couple of extra bolts for the oil pan and be careful to ensure that the oil pan gasket is not damaged.
5. Make sure that the drain holes (see Fig. 1-23) are not blocked in the new casing that is to be fitted.
6. Oil in the seal ring lightly and fit a new gasket.
7. Assemble the parts. Make sure that the casing is correctly centered. Tension the fan belt in accordance with the instructions on page 1-36.
   See the specifications for the tightening torque for the pulley bolt.

Replacing the timing gears

1. Drain off the cooling water and remove the hood and radiator.
2. Carry out the work described in points 1-4 in the previous section.
3. Remove the camshaft nut and pull off the camshaft gear by using tool SVO 2250, Fig. 1-24.
   The sleeve on the crankshaft is forced out with the help of a medium-sized sharp-ground screwdriver. The crankshaft gear is pulled off by using tool SVO 2405, Fig. 1-25.
4. Fit the crankshaft gear with SVO 2407. Fig. 1-26. Fit the camshaft gear with tool SVO 2408, Fig. 1-27. Do not push the shaft in so that the seal washer at the rear end of the camshaft is forced out. Check that the gears have the correct relationship according to the markings shown in Fig. 1-29. There are flats on tool SVO 2407 to turn the crankshaft.
5. Measure the tooth flank clearance, Fig. 1-28. Also measure the shaft end play, this being determined by the shim behind the camshaft gear. See the specifications for the measurement value. Fit the sleeve on the crankshaft.
6. Refit the other parts.

Valve-grinding and decarbonizing

1. Drain off the cooling water.
2. Disassemble the throttle control by loosening the ball joints, cotter pin and bracket on the inlet manifold. Loosen the choke control.

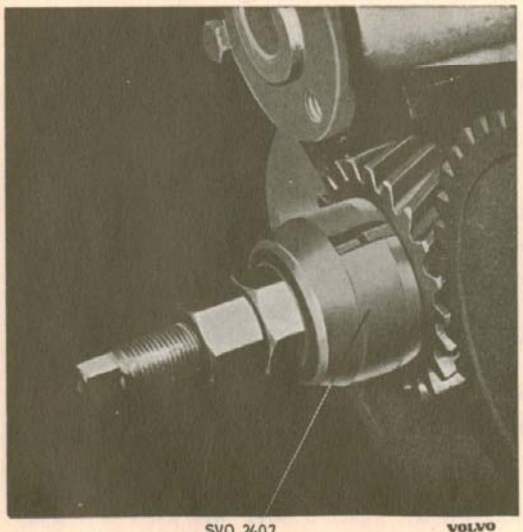


Fig. 1-26. Fitting the crankshaft gear

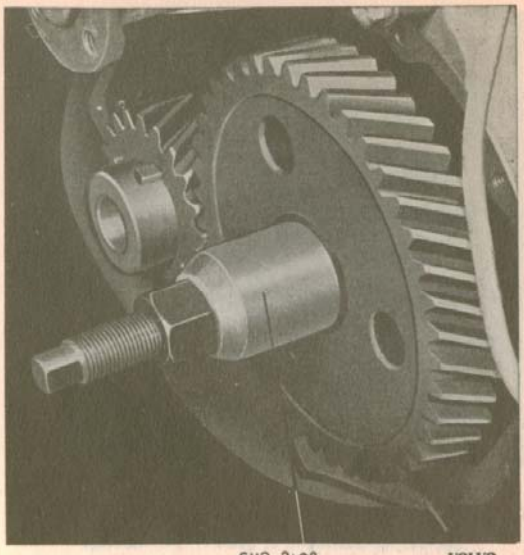


Fig. 1-27. Fitting the camshaft gear

3. Remove the carburetor. Both carburetors must be loosened and removed simultaneously since the intermediary shaft is carried and guided in the carburetor lever.
4. Disconnect the exhaust pipe from the exhaust manifold, disconnect the water hoses to the radiator and disconnect the other connections to the cylinder head.
5. Remove the rocker arm, rocker arm shaft and push rods.
6. Remove the cylinder head bolts, loosen the water

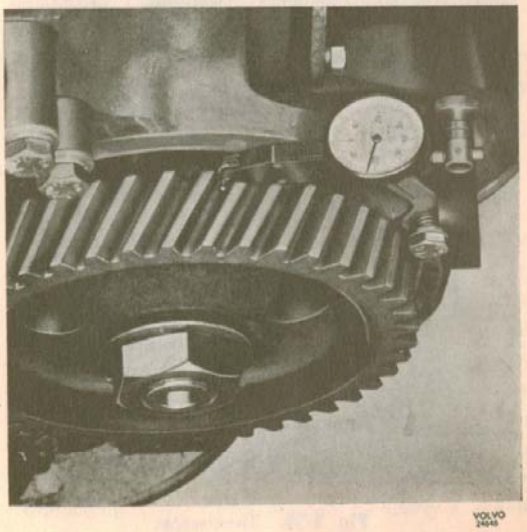


Fig. 1-28. Measuring tooth flank clearance

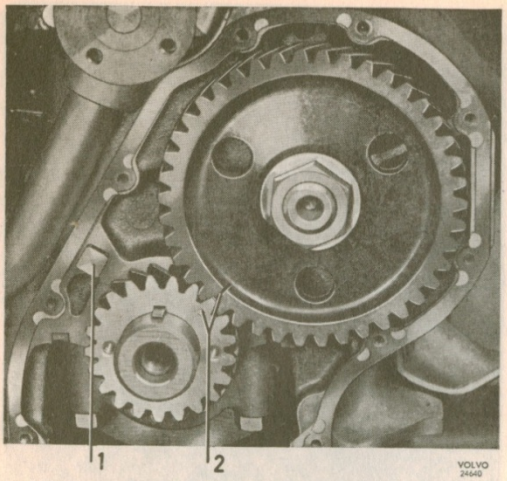


Fig. 1-29. Timing gear setting
1. Jet for lubrication of gears 2. Markings

pipe at the thermostat housing, loosen the attachment at the rear exhaust manifold bolt. Loosen the generator tensioner. Lift off the cylinder head.

7. Clean the piston crowns, combustion chambers, inlet and exhaust ports thoroughly. Do not use emery cloth since small particles can get between the pistons and the cylinder walls and cause damage.
8. Recondition the valve system according to the description under the heading "Cylinder head with valves".
9. Fit the valves. Fit a new cylinder head gasket and new seals for the water pump. Fit the cylinder head. See the specifications for the tightening order and tightening torque. Fit the other parts. Fill up with cooling water.
10. Adjust the valve clearances. Run the engine for a short while. Re-tighten the cylinder head and re-adjust the valve clearances.

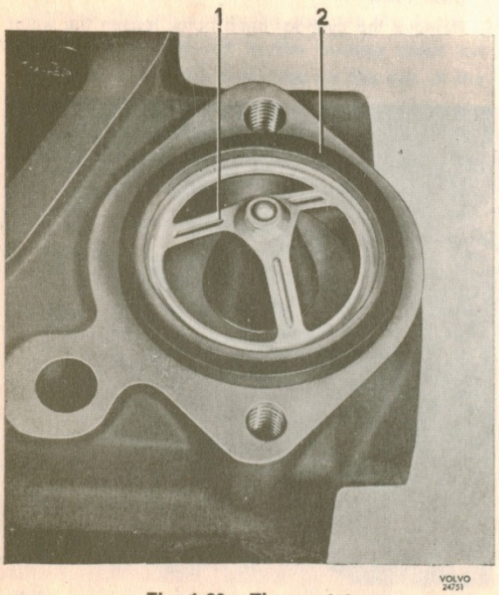


Fig. 1-30. Thermostat
1. Thermostat 2. Gasket

Replacing the thermostat

1. Drain off part of the cooling water.
2. Remove the bolts for the outlet pipe over the thermostat and turn up the pipe.
3. Replace the thermostat (1, Fig. 1-30). Use a new gasket.
4. Screw the pipe into position. Fill up with cooling water and check for leakage.

REMOVING THE ENGINE

1. Jack up the car about 30 cm (12″) over the floor and fit trestles under it.
   Drain off the cooling water and engine oil. Remove the positive pole from the battery.
2. Remove the hood and the radiator. Be careful not to damage the finish on the hood.
3. Remove the throttle control joints at the front and rear of the shaft between the engine and the body. Remove the cotter pin and washer and then pull out the shaft. Disconnect the vacuum tube at the front end of the inlet manifold and

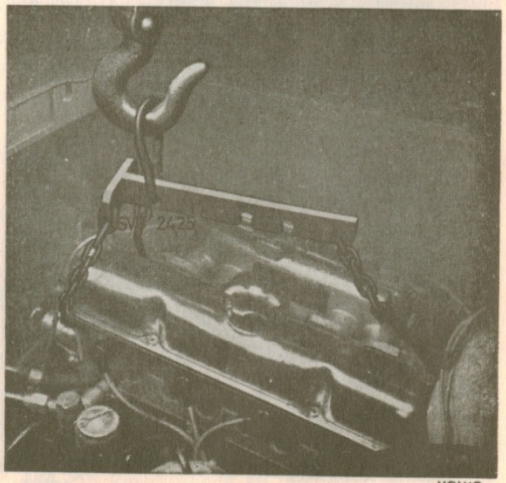


Fig. 1-31. Lifting out the engine

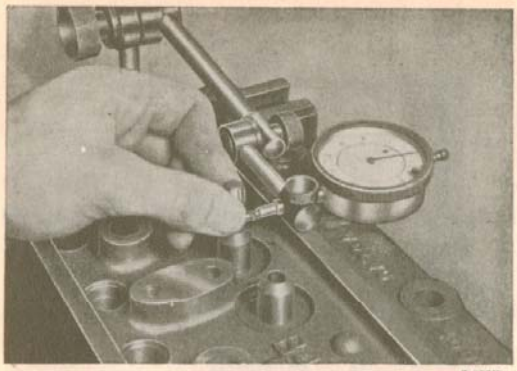


Fig. 1-32. Measuring clearance

disconnect the water pipe on the right-hand side of the thermostat housing.

Disconnect all connections round the rest of the engine. Remove the throttle control shaft behind the flywheel housing.

4. Loosen the exhaust pipe at the exhaust manifold and the attachment on the flywheel housing. Remove the nuts for the engine mounting blocks.
5. Remove the gearshift lever. Remove the control for the clutch and the cables for the overdrive.
6. Disconnect the forward propeller shaft joint. Place a jack under the transmission and raise the jack slightly. Remove the support cross-member.
7. Fit lifting tool SVO 2425 to the engine. Tighten the bolt on the tool in the hole at the front end of the cylinder head, locate the hooks under the manifold front and rear. See Fig. 1-31.
8. Lift the front end of the engine an inch or so to clear the engine mounting blocks. Lower the transmission but not more than necessary and pull the engine forwards at the same time as the front end is lifted. Lift out the engine by gradually raising the front end and lowering the rear end.

DISASSEMBLING THE ENGINE

After the engine has been lifted out of of the car, disassembly is carried out as shown below. (See under the headings concerned for the separate components).

1. Place the engine in a suitable stand. Check that the oil has been drained off.
2. Remove the starter motor and the cover plate on the lower front edge of the flywheel housing together with the transmission and then remove the clutch and flywheel.
3. Remove the rear sealing flange, the generator, the water pump and distributor, the rocker arm

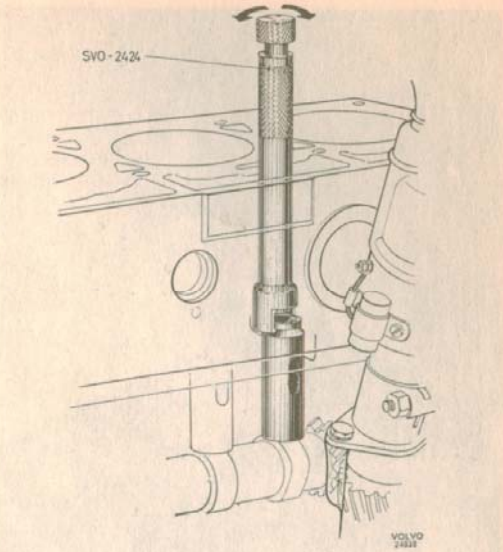


Fig. 1-33. Removing a valve lifter

cover, the rocker arms and the cylinder head. Remove the oil cleaner and oil cooler.

Remove the valve lifters with tool SVO 2424, see Fig. 1-33.

4. Remove the timing gear casing and the timing gears. See under the heading "Replacement of timing gears" for the tools concerned. Remove the camshaft.
5. Stand up the engine on its rear end on a bench. Place three wooden blocks under so that the crankshaft can rotate freely.

   Remove the oil pan, oil pump and connecting rods with pistons. Replace the bearing caps on their respective connecting rods.
6. Lay the engine with the bottom upwards and remove the crankshaft. Replace the bearing caps in their correct positions.

CLEANING

All the engine parts should be carefully cleaned after the engine has been disassembled. Parts made of steel or cast iron can be cleaned in a de-greasing tank with a lye solution. Light-alloy parts can easily be damaged by the lye and should therefore preferably be cleaned in white spirit. Never clean pistons and bearing shells in lye. Rinse the parts with warm water and blow them dry with compressed air after washing. Clean out the oil drillings particularly thoroughly. Clean them through by using a special brush and then blow them out with compressed air.

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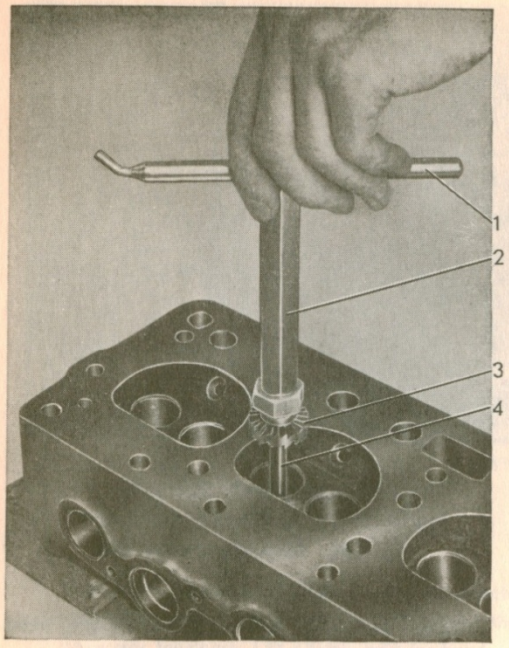

Fig. 1-34. Reaming a valve seat

All the seal plugs at the ends of the drillings in the cylinder block must be removed while cleaning is going on.

CYLINDER HEAD WITH VALVES

Disassembly

1. Remove the rubber seal. Remove the valve springs by first compressing them with a valve spring tool and then removing the valve keys and releasing the tool. Place the valves in order in a special stand.
2. Measure the clearance between the valve spindle and the valve guides as shown in Fig. 1-32. With a new valve this clearance should not exceed 0.15 mm (0.006″). Also check that the valves are not too worn. See under the headings "Valve system" and "Wear tolerances" in the specifications.

Fig. 1-35. Valve seat width
A = 1.5 mm (0.060″)

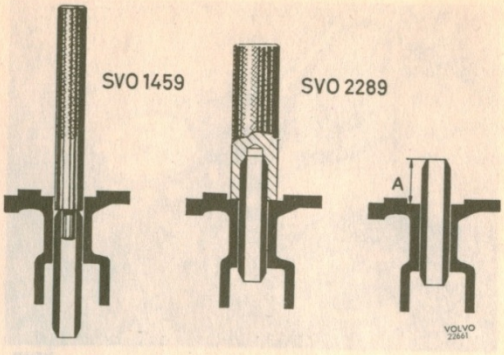

Fig. 1-36. Replacing valve guides
A = 21 mm (0.827″)

Cleaning

Clean the valves, combustion chambers and channels with rotating brushes to remove soot and combustion residues.

Grinding the valves and valve seats

1. Grind the valves in a valve-refacing machine after they have been cleaned. If the valves are very worn, fit new valves.
2. Grind the valve seats. Use an electrically driven valve-seat grinder or a hand reamer. A pilot spindle must first be fitted accurately before the work is started and worn valve guides should be replaced with new guides.
   Grind the seat until satisfactory sealing is obtained. The angle is 45° and the width of the valve seat should be 1.5 mm (0.060″), see "A", Fig. 1-35.
   If the valve seat width is too wide after grinding, it can be reduced from the inside with a grinding stone with an angle of 70° and from the outside with a 20° grinding stone.
3. Smear the valve seat surfaces with a thin layer of fine grinding compound and lap in the valves against their seats.
   Then clean the valves and seats and check for leakage.

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